C 1 EDUCATION AND QUALIFICATIONS

Overview

The society's structural development into a knowledge and services economy has far-reaching consequences for requirements pertaining to qualifications of gainfully employed persons. The reason for this is that the importance of knowledge-intensive sectors with regard to the economy's overall production is continually growing, thereby driving demand for high-quality training. What is more, innovation in knowledge-intensive sectors is a key competitive parameter. These factors continually boost demand for highly qualified employees (in most cases, persons with higher education degrees), who play a key role in the innovation competition.

Human resources are thus the most important resources, and the most valuable asset, with regard to Germany's scientific and technological competitiveness. Human resources comprise all human knowledge and all the various skills and competence that people can possess. And the education system is of central importance with regard to the development of human resources. In particular, the higher-education and vocational-training systems have the task of optimally promoting the talents and skills of people, both young and old, in order to offer them career perspectives in the growing market of the knowledge and services economy. Since human resources cannot be quickly "produced", i.e. they have to be formed and promoted over periods of years, it is especially important to recognize changing qualification requirements promptly and orient the education system accordingly. As a result of the shortages of qualified labour that are emerging via demographic change, this important task will become all the more important in future.

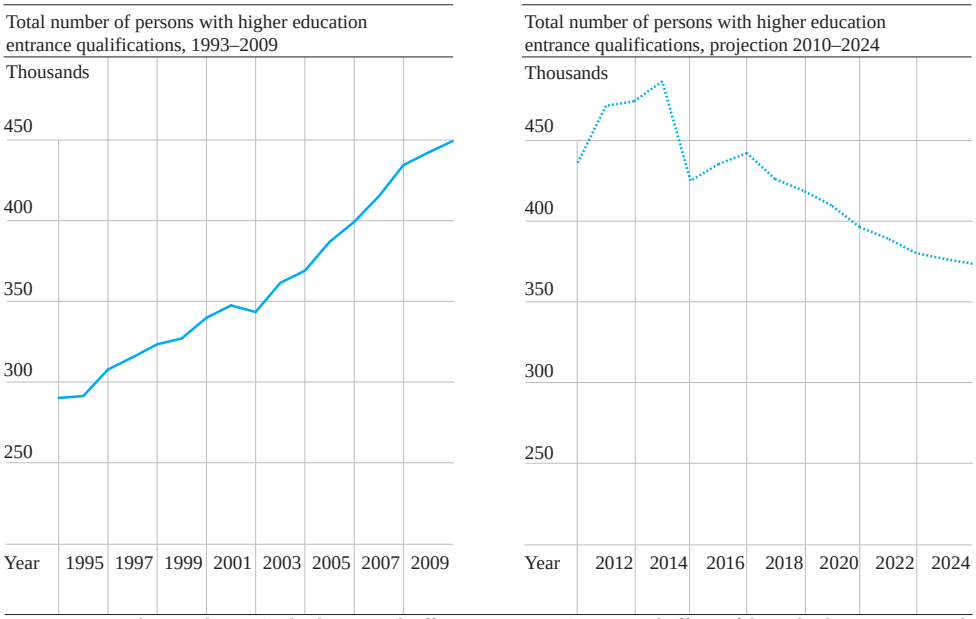
The data for the following short overviews were obtained primarily from a study[340] commissioned by the Expert Commission on Research and Innovation (EFI). Based on surveys of relevant research institutes, the study also takes account of surveys of the Federal Statistical Office, such as the Mikrozensus survey and key statistics on higher education (*hochschulstatistische Kennzahlen*), as well as of the OECD publication "Education at a Glance"[341].

Indicators studied

- School-leavers qualified for higher education in Germany
- New tertiary students in selected OECD-countries
- Foreign students at German universities and colleges
- Graduation rates and relevant subject-group breakdowns
- Further training according to employment status and level of qualification
- Numbers of highly qualified persons, as percentages of employed persons in Europe

SCHOOL-LEAVERS QUALIFIED FOR HIGHER EDUCATION IN GERMANY

C 1–1



Source: *Statistisches Bundesamt* (Federal Statistical Office, various years). Statistical offices of the Federal Government and the Länder: *Bildungsvorausberechnung 2010* (education projection for 2010), preliminary results. In: Leszczenski et al. (2011).

Numbers and proportion of school-leavers qualified for higher education: The persons eligible for higher education include those school-leavers who have earned a general or subject-specific entrance qualification for studies at a university or at a university of applied sciences (*Fachhochschule*).

The numbers of school-leavers qualified for higher education continue to grow

In the period between 1992 and 2009, the total number of school-leavers, from general-education and vocational schools, with higher education entrance qualifications grew nearly continually, from 290,600 to 449,400. That jump represents an increase of 55 percent. At least the available numbers of persons eligible for higher education are thus not likely to be an obstacle for desired increases in numbers of persons with engineering and science qualifications. The absolute numbers of school-leavers with higher education entrance qualifications are not expected to decline, as a result of demographic trends, until after 2014.

The significant growth in the numbers of persons with higher education entrance qualifications is due to the growing participation of relevant age groups in school education and vocational training leading to such qualifications. Those numbers are described via the cohort percentage of persons eligible for higher education, which grew from 30.8 percent to 45.9 percent between 1992 and 2009. Two developments have contributed especially strongly to that growth: disproportionately growing participation of women in higher levels of school education, and introduction of the entrance qualification for universities of applied sciences (*Fachhochschulreife*), which has gone hand-in-hand with the establishment of universities of applied sciences (*Fachhochschulen*), and which can be earned via school-based vocational training or further vocational training.

C 1–2 NEW TERTIARY STUDENTS IN SELECTED OECD COUNTRIES*

Countries	1998	2001	2002	2003	2004	2005	2006	2007	2008
Australia	53	65	77	68	70	82	84	86	87
Finland	58	72	71	73	73	73	76	71	70
France	–	37	37	39	–	–	–	–	–
Germany	28	32	35	36	37	36	35	34	36
Italy	42	44	50	54	55	56	55	53	51
Japan	36	37	39	40	40	41	45	46	48
Netherlands	52	54	54	52	56	59	58	60	62
Spain	41	47	49	46	44	43	43	41	41
Sweden	59	69	75	80	79	76	76	73	65
Great Britain	48	46	48	48	52	51	57	55	57
USA	44	42	64	63	63	64	64	65	64
Average	40	48	52	53	53	54	56	56	56

Figures in percent. *Total of net percentages of entry into tertiary education, for each individual age cohort.
Sources: OECD (2010). OECD Indicators, various age cohorts. In: Leszczenski et al. (2011).

Tertiary education entry rate: Proportion of the appropriate age cohort starting tertiary education. It is a measure for the degree to which demographic resources are being used to create human resources with higher education qualifications.

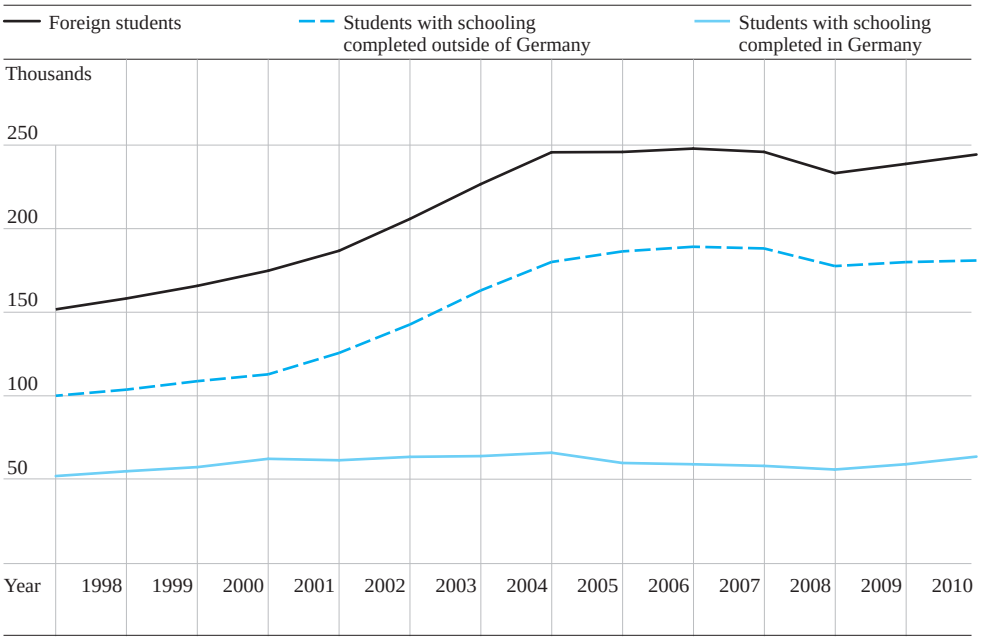
Although its rates of entry into tertiary education have been increasing, Germany still lags behind comparable OECD countries in this regard

Among selected OECD countries, Germany has the lowest entry rate into tertiary education. While that rate has increased by 8 percentage points since 1998, at 36 percent it still is considerably below the corresponding figures in the top group in this category, consisting of Australia (87 percent), Finland (70 percent), Sweden (65 percent) and the USA (64 percent). What is more, the gap between Germany and the relevant OECD average, which increased by 16 percentage points between 1998 and 2008, to 56 percent, has grown considerably. Clearly enough, Germany is not succeeding, to the degree seen in other countries, in interesting its young people to continue on to higher education. One reason for this may be that many types of training that are offered in Germany as dual training, or training with full-time schooling, are provided at universities in other countries. What is more, in Germany children from socially disadvantaged backgrounds are still considerably less likely to undertake university studies than are children from families with academic backgrounds.

Another special aspect of Germany's entry rate into tertiary education is that it shows a balance by gender: 37 percent (women) and 36 percent (men). In all other OECD countries – with the exception of Japan – women account for the majority of new students throughout the entire period covered. On an OECD average, 63 percent of all women of relevant age, and 50 percent of all men of relevant age, entered higher education.

FOREIGN STUDENTS AT GERMAN UNIVERSITIES AND COLLEGES

C 1–3



Source: *Wissenschaft weltoffen* (2010). *Statistisches Bundesamt* (Federal Office for Statistics).
In: Leszczenski et al. (2011).

Foreign students are students who are not German nationals. That group is broken down by persons who earned their higher education entrance qualifications in Germany and persons who earned their higher education entrance qualifications outside of Germany.

Numbers of foreign students at German universities growing again

In the 2009 academic year, a total of 239,000 foreign students were enrolled at German higher education institutions. In the 2009/2010 winter semester, their number grew further, to 244,800. The unprecedented decrease in the numbers of foreign students seen in 2008 – consisting especially of a decrease in the numbers of persons who earned their higher education entrance qualifications outside of Germany – thus has not continued. On the other hand, the maximum level achieved in 2006 has not yet been re-achieved. The reasons for the decrease are unknown. A number of factors could be responsible, such as students' doubts concerning the value of a German higher education degree in their home employment markets. For persons who earned their higher education entrance qualifications outside of Germany, it remains extremely difficult to obtain a work permit in Germany following graduation. Possibly, the general tuition fees that some Länder have introduced have contributed to the decrease in the numbers of foreign students. On the other hand, the number of persons with German schooling who enroll at German higher education institutions has increased again, following years of slow decline; it grew from 56,000 in 2008 to 63,500 in the 2009/2010 winter semester.

The strong increase in the numbers of foreign students seen since the end of the 1990s may be considered indicative of growing interest abroad in German academic degrees. That development is significant for the German innovation system, since foreign students, once they graduate and are highly qualified potential employees, have the option of working either in Germany or for German companies in their home countries.

C 1–4 GRADUATES AND SUBJECTS STUDIED

	1995	2000	2002	2005	2007	2008	2009
Total number of graduates	**197,015**	**176,654**	**172,606**	**207,936**	**239,877**	**260,498**	**287,997**
Percentage who are women	41.2	45.6	48.1	50.8	51.8	52.2	51.7
Percentage who studied at a university	63.6	64.3	63.2	60.8	62.4	62.4	-
Linguistics and cultural sciences	**27,125**	**29,911**	**30,175**	**35,732**	**43,827**	**50,680**	**53,003**
Percentage for that subject group	13.8	16.9	17.5	17.2	18.3	19.4	18.4
Law. economics and social sciences	**66,538**	**62,732**	**62,284**	**76,566**	**85,838**	**87,196**	**101,391**
Percentage for that subject group	33.8	35.5	36.1	36.8	35.8	33.5	35.2
Mathematics. natural sciences	**27,800**	**21,844**	**21,594**	**30,737**	**38,417**	**43,333**	**47,782**
Percentage for that subject group	14.1	12.4	12.5	14.8	16.0	16.6	16.6
Medicine / health sciences	**12,075**	**10,620**	**10,223**	**11,817**	**13,358**	**14,345**	**15,142**
Percentage for that subject group	6.1	6.0	5.9	5.7	5.6	5.5	5.3
Engineering sciences	**47,295**	**35,725**	**32,414**	**34,339**	**38,065**	**42,558**	**47,004**
Percentage for that subject group	24	20.2	18.8	16.5	15.9	16.3	16.3
Art. art history	**7,280**	**7,630**	**7,857**	**9,678**	**10,399**	**11,185**	**11,541**
Percentage for that subject group	3.7	4.3	4.6	4.7	4.3	4.3	4.0

Source: Federal Statistical Office. *Fachserie 11. Reihe 4.2*. Research in HIS/ICE. In: Leszczenski et al. (2011).

Subjects structure and rate of graduation: The subject structure shows the proportion of first degree graduates in each subject or subject group. The rate of graduation measures the proportion of tertiary graduates in the relevant age cohort of the population.

The graduate percentage has increased again sharply; the total number of graduates will remain at the 2008 level until 2023

The trend whereby the number of first-time graduates has been increasing continued in 2009, and that number reached a new record in that year: 288,000. At the same time, not all new graduates are available to the employment market. A considerable percentage of the some 71,000 persons with bachelor's degrees continue their studies, and about one-fifth of graduates who earn a traditional degree (*Diplom* or *Magister*) first pursue doctoral studies before seeking employment. At the same time that the numbers of first-time graduates were increasing, the graduate percentage also increased. That latter trend shows that larger and larger percentages of young people earn a higher education degree. At 23 percent, the graduate percentage is still far from the 35-percent level that the Science Council (*Wissenschaftsrat*) considers desirable, in light of the continuing development of knowledge-society structures.

In 2009, the relevant subject structure shifted in some cases significantly with respect to the previous year. While the number of graduates in linguistics and cultural sciences increased by only 4.6 percent, the number of graduates in law, economics and social sciences increased by an average of 16.3 percent. The pertinent increases in engineering and the natural sciences were of an average order, and those fields' share of all graduates remained unchanged. The small percentages of women in both subject areas remained largely unchanged (engineering: 22.6 percent; natural sciences: 40.1 percent).

FURTHER TRAINING ACCORDING TO EMPLOYMENT STATUS AND LEVEL OF QUALIFICATION

C 1–5

	1996	1997–1999	2000–2002	2003–2005	2006	2007	2008
Gainfully employed persons	**4.1**	**3.8**	**3.4**	**5.2**	**5.3**	**5.5**	**5.6**
low (ISCED 0–2)	1.1	1.0	0.9	1.3	1.3	1.1	1.3
medium (ISCED 3–4)	3.8	3.4	3.1	3.8	3.9	4.0	4.1
high (ISCED 5–6)	6.7	6.2	5.4	10.0	10.6	10.8	10.8
Unemployed persons	**5.5**	**4.5**	**4.4**	**2.7**	**2.4**	**2.8**	**3.3**
low (ISCED 0–2)	2.0	2.0	2.1	1.5	1.4	1.7	2.0
medium (ISCED 3–4)	5.9	4.8	4.7	2.7	2.4	2.9	3.6
high (ISCED 5–6)	10.7	8.5	7.9	5.2	5.0	5.5	5.2
Persons outside the labour force	**4.1**	**3.5**	**3.3**	**1.1**	**0.9**	**0.8**	**0.9**
low (ISCED 0–2)	0.5	0.5	0.6	0.4	0.4	0.4	0.5
medium (ISCED 3–4)	5.8	4.7	4.2	1.3	0.9	0.8	0.9
high (ISCED 5–6)	8.9	7.4	6.3	2.1	2.0	1.7	2.0

Figures in percent. Basic total considered: All persons from the ages of 15 to 64. With regard to ISCED. cf. page 92. Source: *Mikrozensen 1996 bis 2008*. Calculations of HIS/NIW/BIBB. In: Leszczenski et al. (2011).

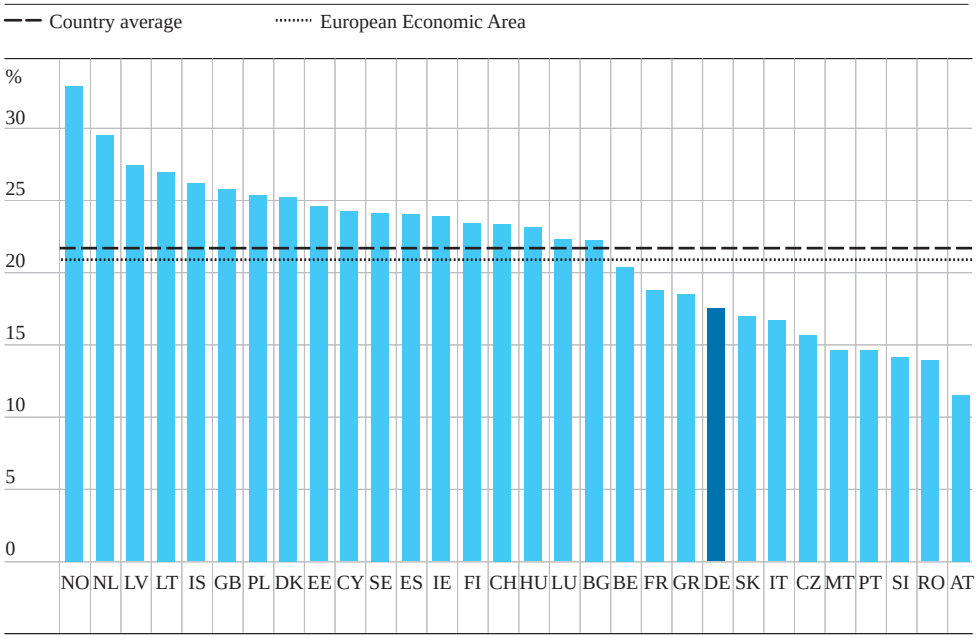
Further education rates: percentages of persons who participated in a continuing vocational training measure within the four weeks preceding the time of the survey.

Trend continues whereby working persons engage in continuing vocational education and training

In the area of further vocational training, gainfully employed persons continue to be more active than unemployed persons and persons outside the labour force. From 1996 to 2008, the percentage of persons who had participated in further vocational training within the four weeks preceding the pertinent survey increased from 4.1 percent to 5.6 percent. The increase in further vocational training on the part of highly qualified gainfully employed persons is particularly noticeable (10.8 percent in 2008 and only 6.7 percent in 1996).

While this trend is welcome, it is accompanied by another that gives grounds for concern: since 1996, participation rates of unemployed persons, and of persons outside the labour force, in further vocational training have been decreasing continually. While in 1996 5.5 percent of all unemployed persons, and 4.1 percent of all persons outside the labour force, had participated in further vocational training within the aforementioned four-week period, in 2008 the corresponding figures were (respectively) only 3.3 percent and 0.9 percent. In a noticeable contrast to the increasing rates of participation in further vocational training seen among highly qualified employed persons, the corresponding rate on the part of highly qualified unemployed persons and persons outside the labour force has been decreasing sharply since 1996. Only 5.2 percent of highly qualified unemployed persons, and 2 percent of highly qualified persons outside the labour force, took part in further vocational training in 2008. The corresponding figures for 1996, respectively, were 10.7 and 8.9 percent.

C 1–6 PROPORTION OF EUROPE'S WORKFORCE WHO ARE HIGHLY QUALIFIED* IN 2009



*ISCED 5a + 6.
Source: Eurostat. *Europäische Arbeitskräfteerhebung.* Calculation of the NIW. In: Leszczenski et al. (2011).

Highly qualified persons: persons who, pursuant to the International Standard Classification of Education (ISCED), have a tertiary educational qualification. That level comprises Diplom, Bachelor's and Master's degrees (level 5a), as well as doctoral degrees and habilitation qualifications (level 6) at universities (including universities of applied sciences).

In spite of increases, the numbers of highly qualified persons in Germany (as a percentage of all persons) are still below the European average

Although the percentage for employed persons with higher education qualifications has been increasing for years, in 2009 that percentage in Germany, at 17.6 percent, was more than three percentage points below the corresponding average value for the European Economic Area (EEA).

Germany's lag in employment of persons with higher education qualifications is not due to any deficits in individual sectors. Employment of persons with higher education qualifications is below the EEA average in both knowledge-intensive and non-knowledge-intensive branches of the manufacturing and services sectors. The discrepancies are particularly large in the area of knowledge-intensive services. While in the UK and in northern European countries 43.2 and 45.7 percent, respectively, of all employees in that sector have a higher education qualification, the corresponding figure for Germany is only 30.4 percent. And most European countries also have higher rates of employment of highly qualified persons in non-knowledge-intensive economic areas than Germany does. This indicates that Germany's relatively low percentage of highly qualified persons, in knowledge-intensive economic areas, is not due to any misallocations between knowledge-intensive and non-knowledge-intensive sectors. Instead, it seems as if Germany simply has too few highly qualified persons.